WASHINGTON WORKS - DRY RUN LANDFILL
RESPONSE TO EPA INFORMATION REQUEST ON DRY RUN LANDFILL

(Letter, Stewart to Caspar, dated 3/20/97)

*BCC: A. V. Malinowski, Legal, D8078-1
B. J. Reilly, Legal, D8068
In Turn:
J. H. Little
H. D. Ramsey
W. M. Stewart
In Turn:
R. A. Kirschner
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R. W. Meloon
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C. T. Alt
J. J. Mentink
R. L. Ritchey
G. Woytowich
D. A. Weber

* "Exhibit" attachments not included

12541-2

DUPONT

DuPont
Washington Works
P. O. Box 1217
Parkersburg, WV 26102-1217

March 20, 1997

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Ms. Sarah L. Caspar (3HW32)
Removal Enforcement and Oil Section
U. S. Environmental Protection Agency
841 Chestnut Building
Philadelphia, PA 19107

RE: Information Request Letter, Dennis P. Carney to Walt Stewart, dated 2/13/97; received on 2/19/97.
Facsimile Transmittal, Bernard J. Reilly to Sarah Caspar and Ami Antoine, dated 2/28/97.

Dear Ms. Caspar:

Attached is our confidential business information response to the Dry Run Landfill information request received on February 19, 1997. This submittal contains proprietary DuPont Washington Works manufacturing process descriptions which are considered confidential business information. We request that this information not be released to the public.

If you have any questions or would like to discuss any of the information contained in this submittal, please call me on 304-863-4271.

Very truly yours,

W.M. Stewart

W. M. Stewart
Sr. Environmental Control Consultant
Washington Works

Attachment

cc: B. J. Reilly, DuPont

12541-3

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Washington Works -- Overview

Washington Works is located on the Ohio River six miles south of Parkersburg, West Virginia. The plant site was originally owned by the "Father of Our Country", George Washington -- hence the community name Washington Bottom, and the plant name.

Du Pont purchased 450 acres in 1945 following a careful study and examination of the desirability and potential of several alternative locations. Three years later, on January 15, 1948, the first pound of Nylon polymer was produced. Since that time, employment has increased from 200 to over 2400; product lines have quadrupled, and the plant now has 14 operating and service divisions which spread out for nearly a mile along the Ohio River. Last year, wages, salaries, and plant purchases added over 150 million dollars to the local economy. Employees are drawn from a geographical radius of about 40 miles in both Ohio and West Virginia. Plant property now totals approximately 2000 acres, including Blennerhassett Island, which is a water source.

Plant employees established a new West Virginia Industrial Safety Record of 14,612,186 exposure hours on April 25, 1982. The previous safety record was set by Washington Works in November, 1975, surpassing Du Pont's Belle Works state mark. The Du Pont Company has held the state record since 1947, the year record keeping began.

Washington Works has held the National Safety Council record for plastics manufacturing since May, 1984. On October 3, 1986, Washington Works achieved the No. 1 safety performance position within Du Pont, going for 8 years and 45.6 million exposure hours without a lost workday case and maintaining the No. 1 position for well over a year.

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Community Information

Parkersburg, located at the confluence of the Little Kanawha and Ohio Rivers, has a population of approximately 34,000. It is the county seat of Wood County and the center of the Parkersburg, West Virginia - Marietta, Ohio metropolitan area which a population of almost 161,000.

Employment in the Parkersburg-Marietta area is over 67,000 with one-third involved in manufacturing. The manufacture of primary metals, fabricated metals, chemicals and allied products, and glass products accounts for three-quarters of the industry in the area. Washington Works is the largest single employer in Wood County. Other Large industries include General Electric Plastics, Shell, Elkem Metals, Corning, American Cyanamid, Goodrich, Ravenswood Aluminum, and Schuller International, Inc.

A branch of West Virginia University is located at Parkersburg and offers both 2 year and 4 year degree programs. Ohio Valley College is a two-year college in the city. Nearby Marietta College and Ohio University in Athens offer graduate as well as under graduate degrees in a variety of curricula.

The Wood County school system, considered one of the states best, educates approximately 15,000 students in 26 elementary schools, 5 junior high schools, 3 senior high schools, and a modern facility for special education. In addition, there is a Catholic elementary school, a Catholic high school, and several other Christian schools.

Community Information

Parkersburg has two fully accredited hospitals. Both have recently undergone major expansion and modernization. Each has its own ambulance service. These hospitals serve an eight-county region of West Virginia and neighboring counties in Ohio.

The Parkersburg Actors Guild and the Parkersburg Art Center enable area residents to develop their talents and enjoy the talent of others. Parkersburg became the home of the Wood County Library in 1976. In July of 1986, the Artsbridge organization was founded to promote cultural growth in the Parkersburg/Marietta area. This association encompasses both Ohio and West Virginia and includes the funding for a number of agencies of the arts and tourism in both states.

The Du Pont owned Blennerhassett Island became a state park in 1989, and the replication of the historic Blennerhassett Mansion on the Island is now complete on the exterior. Finishing of the interior is in progress. Furnishing with antiques and artifacts collected by the Blennerhassett Museum is complete in the kitchen dependency and the study and is planned for the rest of the elegant house.

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BUTACITE®* Process

BUTACITE®* is a tough thermoplastic sheeting. It is derived from PVA (*polyvinyl alcohol*), BA (*Butyraldehyde*), and 4G7 (*tetraethylene glycol diheptanoate*). PVA is purchased from the Ethylene Polymers Division while both BA and 4G7 are supplied by non-company vendors.

Initially, the PVA is dissolved in hot water and acidified. After acidification, BA is added to the PVA at a controlled ratio and a condensation reaction occurs. The resulting PVB is insoluble in water. It precipitates and is washed to remove inorganic salts. At this point some of the PVB goes to a drying operation. This material is then shipped to other BUTACITE® locations and becomes feedstock for dry extrusion operations. The PVB, for Washington Works consumption, is then plasticized with 4G7 in stirred vessels and mixed with precut recycle to form extrusion feed.

In extrusion, the slurry is dewatered, mixed with adhesion control additives, and pumped to the sheeting-forming die. The sheeting is water quenched, dried, relaxed, moisture conditioned, inspected, slit to ordered width, and wound into rolls. To prevent blocking, the sheeting is refrigerated. A gradient band is printed on some automotive sheeting in a separate rotogravure printing step. All rolls are packaged in Tyvek®*/foil bags to prevent moisture pickup and placed in corrugated containers.

* Indicates Du Pont's registered trademark.

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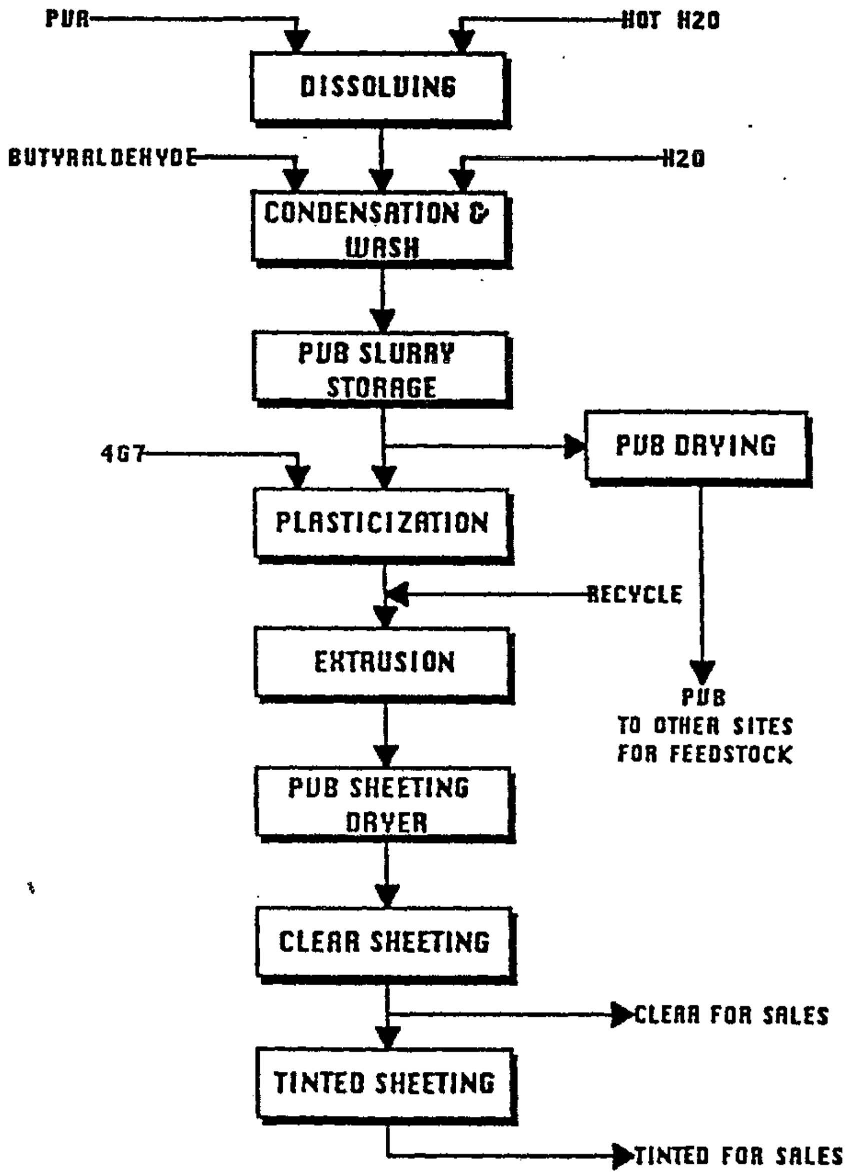
BUTACITE®* Process



* Indicates Du Pont's registered trademark.

Fluoropolymers Monomer Process

TFE (*tetrafluoroethylene*)

TFE is produced by pyrolysis of FREON®*-22 in gas fired furnaces. The pyrolysate is cooled, compressed, and separated by distillation. A TFE/HCL azeotrope (called distillate) is distilled overhead in the TFE primary column and stored as a liquid at -25 degrees C. TFE distillate is used to produce TFE and HFP monomers for the manufacture of TEFLON®* and TEFZEL®* resins.

TFE distillate is fed to the TFE refining train where HCL, inerts, and impurities are removed. The refined TFE is used in the polymer areas for production of TEFLON® resins. TFE distillate is also shipped to various locations for manufacturing VITON®*, NAFION®*, and other products.

Aqueous HCL is an important by-product of TFE refining. The acid is concentrated, and then converted to a high-purity solution of calcium chloride which is sold or disposed of in the Ohio River.

HFP (*hexafluoropropylene*)

HFP is produced by TFE pyrolysis. Scrubbed TFE (no HCL) and TFE-dimer are converted to HFP in an electrically heated furnace. The resultant pyrolysate stream is cooled, compressed, and refined by distillation.

Refined HFP is used in polymer areas for the manufacture of TEFLON®* resins. HFP is also shipped to various locations for manufacturing VITON®*, NAFION®*, and other products.

*Indicates Du Pont's registered trademark.

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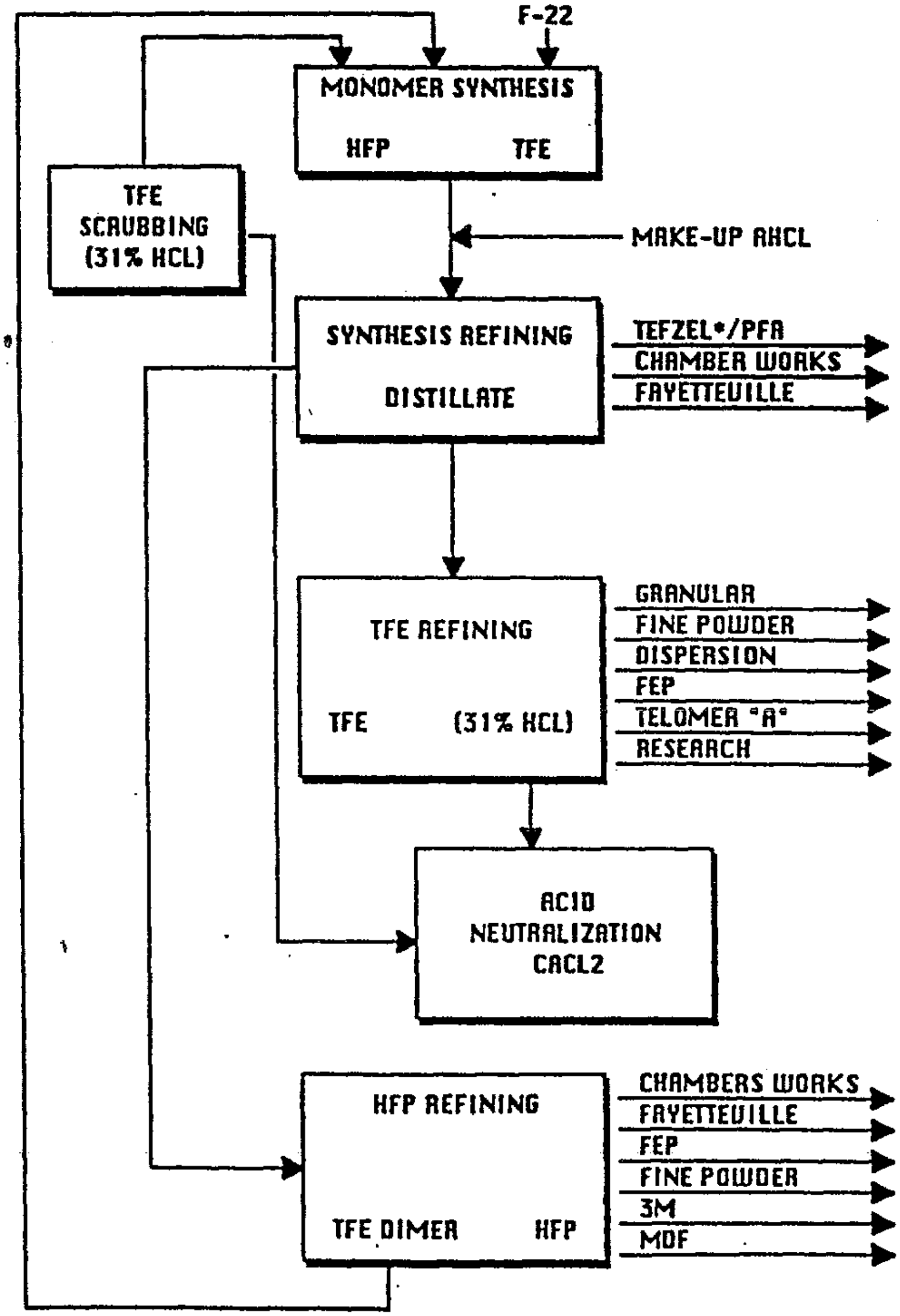
Fluoropolymers Monomer Process



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* Indicates Du Pont's registered trademark.

Fluoropolymers Polymer Process

GRANULAR

TFE is polymerized in water under vigorous agitation to form a slurry of coarse TEFLON®* particles. This slurry is cut in a Taylor-Stiles cutter to 20-50 micron particles. These particles are then pelletized, dried, heat treated, and packed out. Granular TEFLON®* is ram extruded to make bar stock or is formed into billets which are skived into tape or sheeting.

FINE POWDER/DISPERSION

In the fine powder/dispersion autoclaves TFE is polymerized in water either alone or with comonomers to produce a colloidal dispersion of TEFLON®* particles in water. This milky liquid is stabilized with surfactant, concentrated, and blended with other ingredients to make TEFLON®* dispersion. Dispersion is used as coating on architectural fabric, glass filter fabric, or for cooking utensils.

Alternatively, the dispersion may be coagulated and dried to form a fine powder. This fine powder may be paste-extruded to form wire coating, tubing, tape, hose, or porous sheeting.

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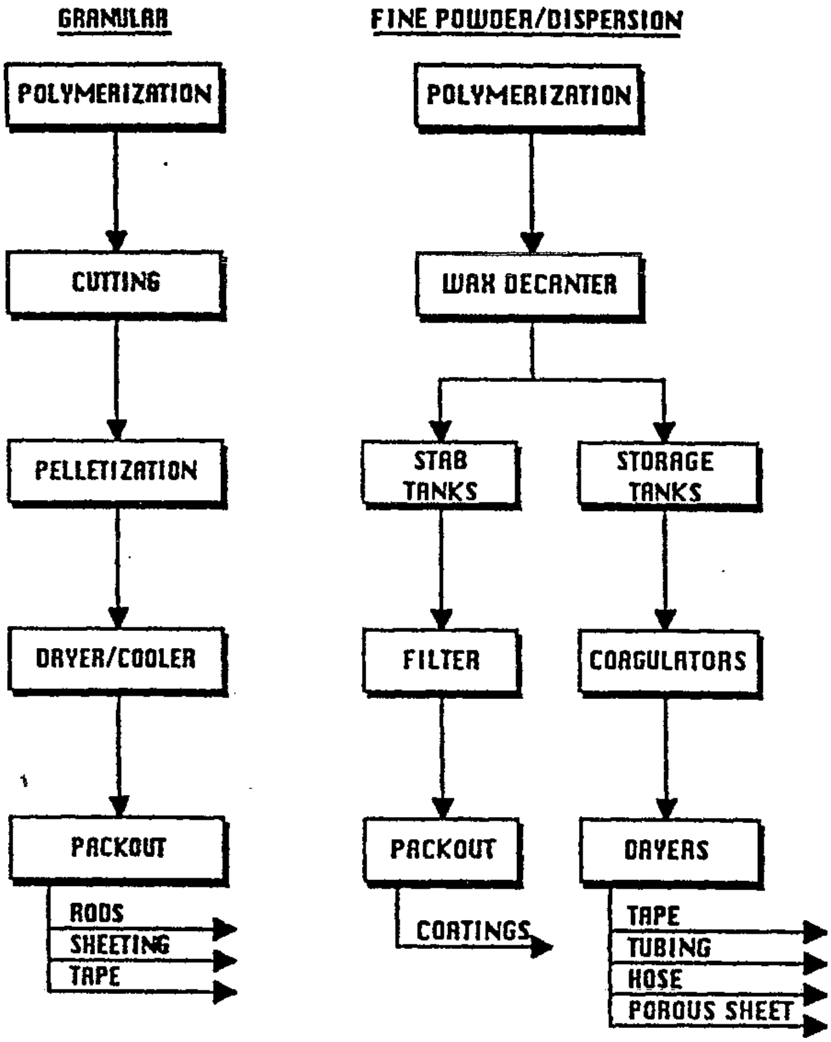
Fluoropolymers Polymer Process



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TEFLON®* FEP Process

TEFLON®* FEP (Fluorinated Ethylene Propylene) is a melt-processible, thermoplastic resin exhibiting an outstanding combination of chemical and thermal resistance properties. Primary end use applications include wire and cable insulation, film and tubing,and chemically resistant linings. FEP is produced by the co-polymerization of TFE (*tetrafluoroethylene*) and HFP (*hexafluoropropylene*) in an aqueous media. Both monomers are produced at Washington Works.

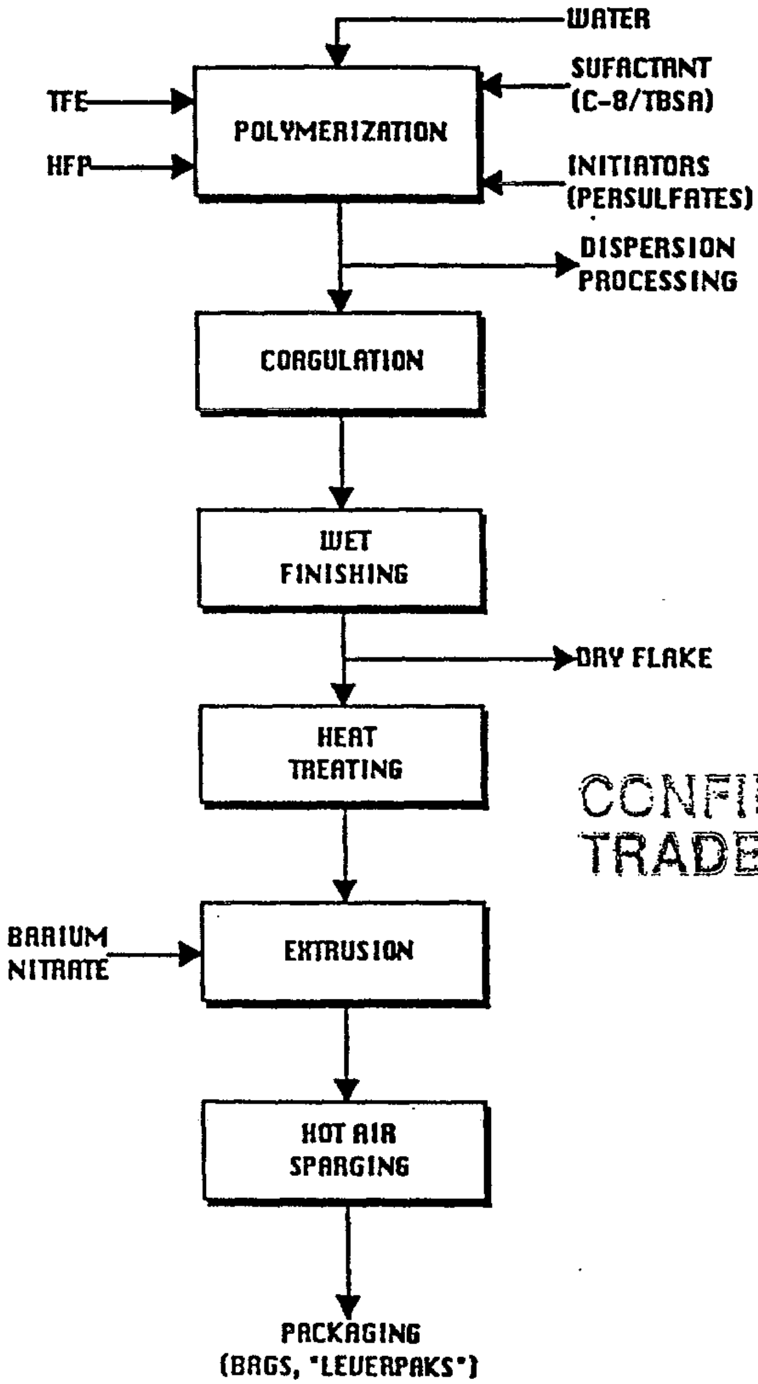
The first process step, polymerization, is an aqueous batch process. Monomers are added to a stirred reactor containing water, a surfactant, and persulfate initiators. Following reaction, a small percentage of the product, a dispersion, may be processed directly into a concentrated salable form. However, the majority of reaction product is mechanically coagulated to produce a light, powdery fluff.

In the wet finishing process, individual batches are blended, conveyed to dewatering facilities, and then dried. This dry feed, called flake, may be packed directly out for sale. The majority of flake is loaded into trays and passed through high temperature ovens. Here the polymer is melted in the presence of moisture-laden air. Chemically unstable polymer end groups react with water to form stable hydride end groups, and unstable material in the polymer chain is thermally removed. Following cooling, the polymer slabs are removed from trays and mechanically shredded for extrusion feed. A small quantity of barium nitrate is added as an anti-color agent.

The extruded FEP is water quenched, melt cut into pellets, and pneumatically conveyed into hot air sparging bins when residual dissolved fluorocarbon gases are removed. After cooling and quality testing, the cubes are packaged either in 400 pound "Leverpaks", 55-pound Kraft bags with a polyethylene inner liner, or 5000 pound bins for shipment to Circleville.

* Indicates Du Pont's registered trademark.

TEFLON®* FEP Process



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* Indicates Du Pont's registered trademark.

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TEFZEL®*/TEFLON®* PFA Process

TEFZEL®* and TEFLON®* PFA are ter- and copolymers, respectively, of TFE, which demonstrate superior high temperature properties when used as insulation in the wire and cable industry. TEFZEL®* is produced by reacting TFE, ethylene, and PFBE (*perfluorobutylethylene*) using cyane (*cyclohexane*) as the chain transfer agent. PFA is produced by reacting TFE with PPVE (*perfluoropropylvinyl ether*) using ethane as the chain transfer agent. Both use FREON®*- 113 as a reaction solvent with a 3-P (*perfluoropropionylperoxide*) initiator. Both the TFE and 3-P are produced at Washington Works, with PFBE, PPVE, and FREON®*- 113 being produced at other Du Pont locations. Only ethylene and our small requirements of ethane and cyane are supplied by non-company vendors. FREON®-113 is a chlorofluorocarbon which is being phased out per the Montreal Protocol. Efforts are underway to find a replacement solvent for fulltime use by 1-1-95.

Each product is produced in its own facility; however, both processes are essentially identical. The reaction step consists of a continuous free radical polymerization in an agitated constant-environment reactor which produces a polymer slurry in the FREON®*- 113 solvent. The slurry is transferred to the polymer separator where untreated monomers are flashed off and sent to monomer recovery. The polymer is then dropped into a batch dryer for removal of the remaining FREON®*- 113 solvent which is sent to the solvent recovery section of the process for refining and recombination with the monomers from monomer recovery to eventually be recycled back to polymerization.

The dried polymer fluff is then compacted on line #1 (PFA) and the material running through line #2 (TEFZEL®*) is compacted and granulated to a polymer flake which can be sold for special applications. The majority of the flake, however, is extruded and melt cut into cubes, blended, and sold in shipping bins and 12-gallon "Leverpacks" (PFA) or 45-pound (TEFZEL® *) bags.

Some of the PFA copolymer is fluorinated to improve the product and end-group stability for critical applications. Currently, PFA 350 is also methyl ester end capped.

* Indicates Du Pont's registered trademark.

TEFZEL® */TEFLON®* PFA Process

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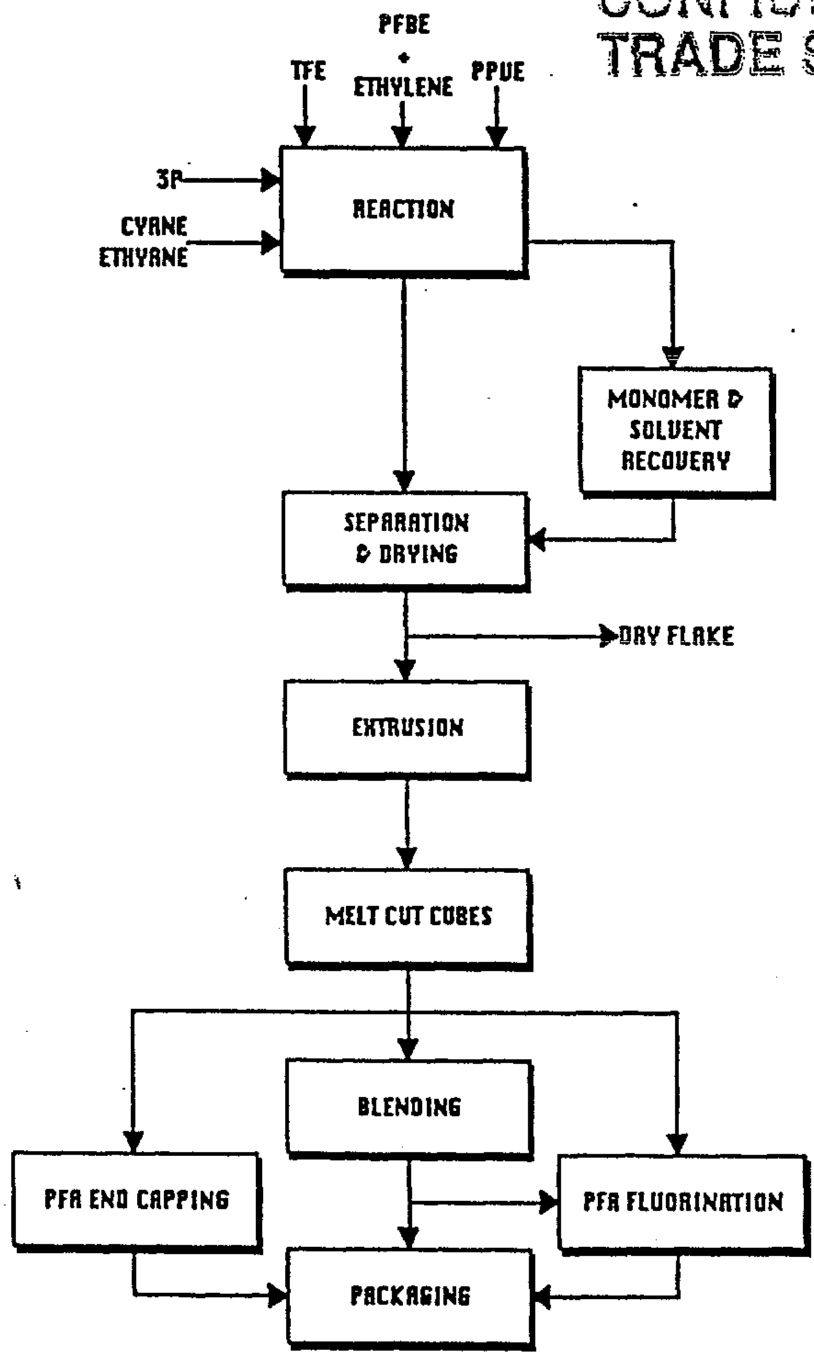

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ZYTEL®* Process

ZYTEL®* is the trademark of Du Pont's nylon used in plastics applications. Hexamethylenediamine and adipic acid are reacted in the presence of water to form the most common variety of nylon salt (6,6). NRD-47 replaces adipic acid in some salt (6,12). Caprolactam (type 6 nylon) is polymerized by itself or with 6,6 salt to form copolymers.

The polymerization process consists of heating the salt at pressures up to 250 psig to boil off the water used in making the salt and the additional water that is formed by the polymerization reaction. Temperature continues to rise as the pressure is reduced to atmospheric pressure or into the vacuum region. The molten nylon at 260 - 290 degrees C is then extruded, quenched, and cut into pellets. The continuous polymerization process uses only 6,6 salt. Chemical additives are incorporated in the nylon for specific end use properties such as heat stability, fast molding, weatherability, and hydrolysis resistance.

The pellets are either packaged for sale, transferred to other divisions such as DELRIN®* or Filaments for use in their processes, subjected to additional heat under a nitrogen sweep (solid-phase polymerization process) for extrusion and film uses, or fed into one of several compounding extruders.

The extrusion compounding process combines the nylon with reinforcing agents such as glass or minerals, or tougheners such as SURLYN®* and NORDEL®* rubber to give particular end use properties. Additives and colorants can also be added in the compounding step.

* Indicates Du Pont's registered trademark.

ZYTEL®* Process

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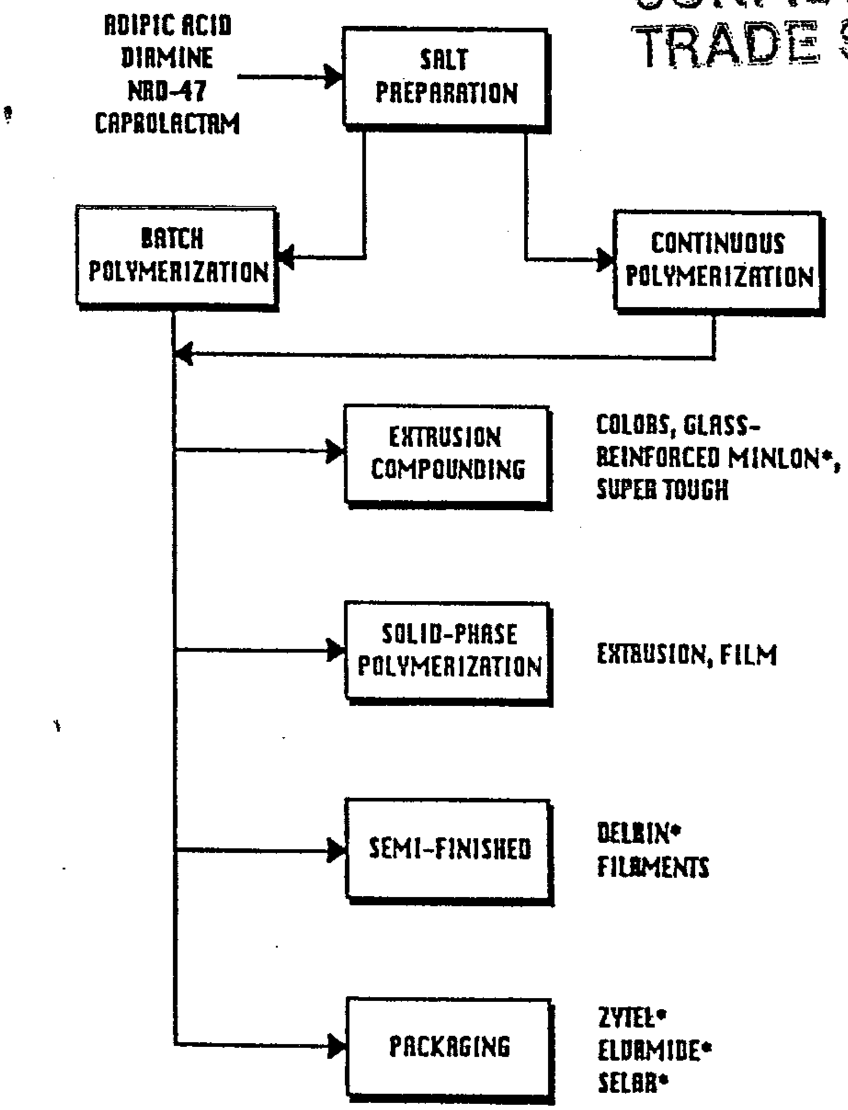

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Engineering Polymers Compounding Process

BEXLOY®*, DELRIN®*, HYTREL®*,MINLON®*, RYNITE®*, and ZYTEL®* are part of Du Pont's family of Engineering Polymers. The family includes mineral and glass reinforced nylon (MINLON®* and ZYTEL®* GRZ) glass reinforced polyethylene terephthalate (PET) (RYNITE®*), DELRIN®* acetal, toughened nylon (ZYTEL®* ST) and acetal (DELRIN®* ST), polyester elastomer (HYTREL®*), and a wide range of extended, modified, and colored resins in four main product lines. BEXLOY®* automotive resins consist of members from nearly every branch of the Engineering Polymers family.

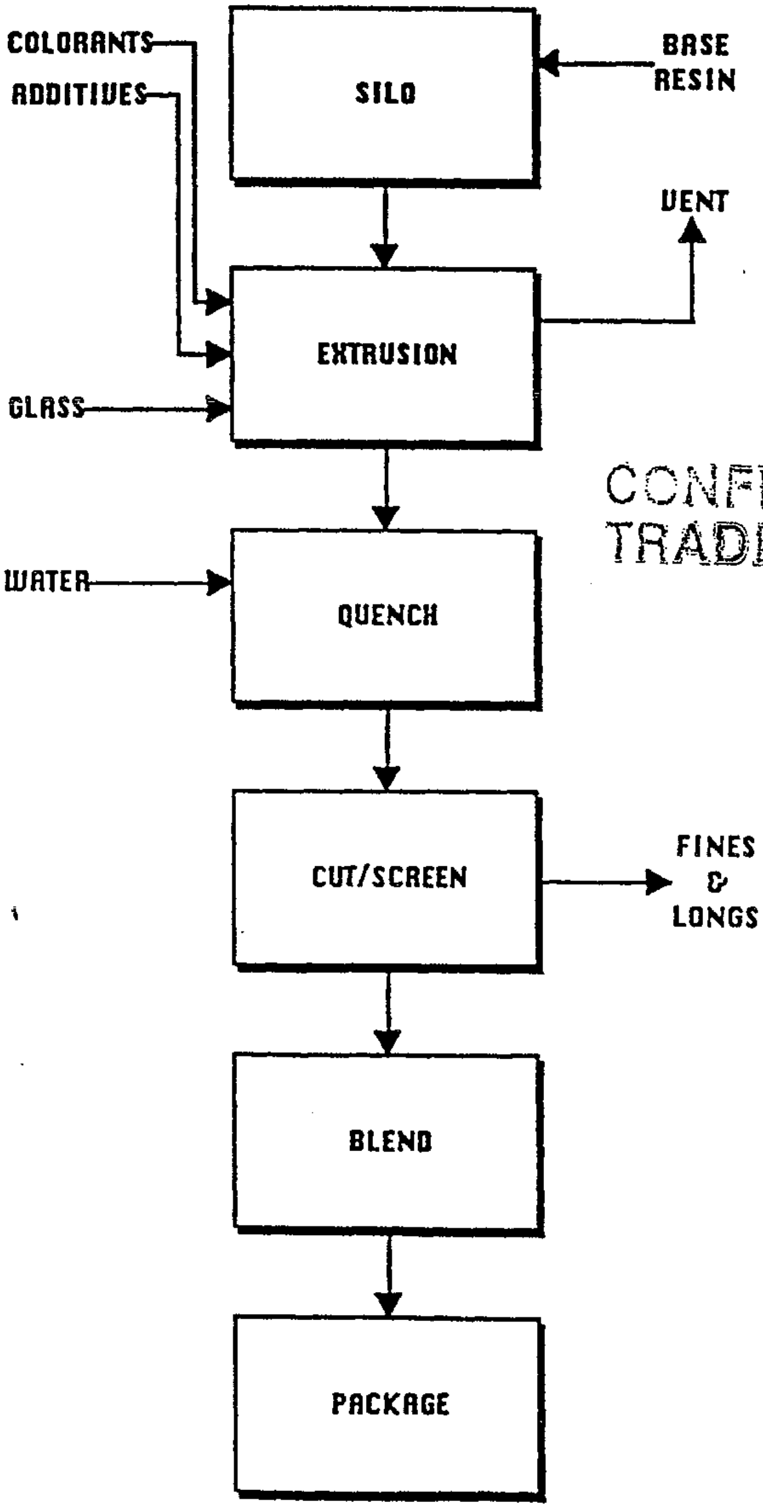
Nylon polymer is obtained from Washington Works' ZYTEL®* division and Chemicals Department. Acetal polymer is obtained from Washington Works' DELRIN®* division. PET is obtained from Textile Fibers and as a transferred feddstock from MYLAR®* and the polyester elastomer feed is from Chambers Works.

In addition to the polymer feedstocks, various additives (e.g. tougheners, strengtheners, colorants, etc.) are mixed together and fed to extruders. The extruders compound the additives into the base polymers, and the compounded polymer is then extruded through dies to quenching and cutting steps.

The 1/8" long pellets from the cutting step are screened for longs/fines, blended for improved uniformity, and then packaged in sealed containers to prevent moisture absorption.

* Indicates Du Pont's registered trademark.

Engineering Polymers Compounding Process



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DELRIN®* Process

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The DELRIN®* process begins with the production of formaldehyde from methanol in our own formaldehyde plant. This plant produces formaldehyde monomer in a 55% aqueous solution.

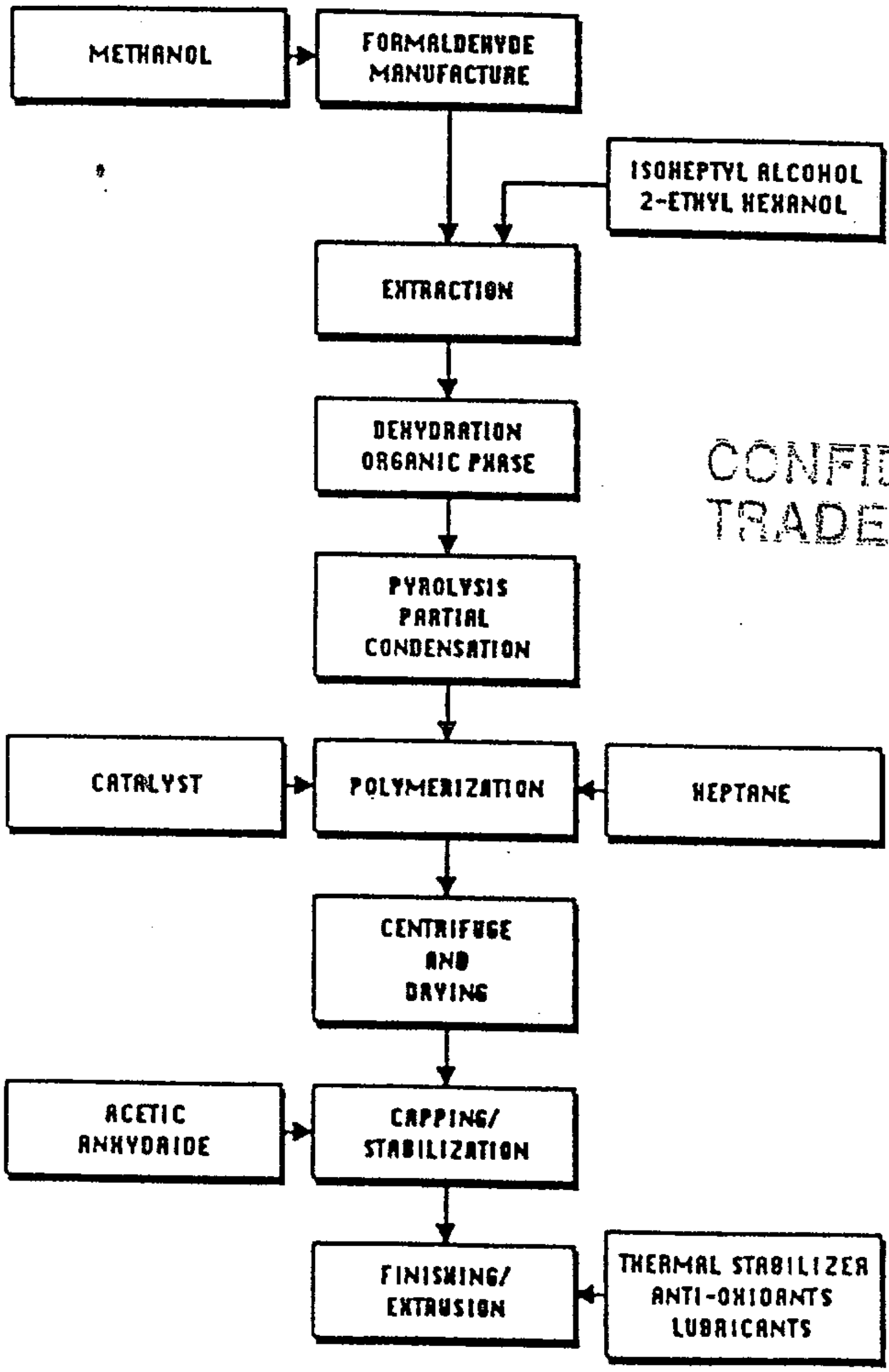
The next step is monomer purification by extraction with alcohol to remove water. Other chain transfer agents are removed by vacuum distillation of the organic phase, pyrolysis, and finally partial condensation to achieve 99.9+% pure formaldehyde monomer.

Polymerization is carried out continuously in a heptane solvent with the addition of a polymerization catalyst. The polymer is insoluble in the solvent, and the particles grow to a controlled particle size by surface polymerization. Polymer and solvent are separated in a centrifuge; the solvent is recycled and the polymer is dried via a pneumatic dryer. The raw polymer contains hydroxyl end groups which make the polymer unstable to heat. To stabilize the raw polymer, it is end capped by treating it with acetic anhydride vapors. The anhydride replaces the hydroxyl end groups with stable acetate groups.

In the finishing step, the capped end polymer is mixed with stabilizers, antioxidants, and pigments (except for natural compositions), extruded, and melt cut into DELRIN®* molding powder. We market a wide range of colored compositetions in the various grades of DELRIN®*.

* Indicates Du Pont's registered trademark.

DELRIN® *Process



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Acrylics Process

The Acrylics area produces LUCITE®* and ELVACITE®* acrylic bead resins by suspension polymerization, and liquid acrylic sirup by continuous bulk polymerization. LUCITE®* resins are used in castings, embedments, and dental products. ELVACITE®* resins are used in the manufacture of paints, coatings, adhesives and Riston®* dry film photo-resist. Acrylic liquid sirup is used by the Yerkes plant in Buffalo, NY in the manufacture of Corian®* solid surface products.

The primary monomers are methyl methacrylate and other esters of methacrylate acrylic acids. Most are produced by Du Pont, but some are purchased from outside sources.

A wide variety of resins is produced by batch suspension polymerization using various combinations of monomers and different reaction conditions. The addition of ingredients is controlled by a computerized batching system. The monomers are dispersed and suspended in water by agitation and a granulation agent. The reaction is started by addition of benzoyl peroxide or diazo free-radical initiators. Molecular weight is controlled by addition of mercaptans as telogens.

The monomer droplets polymerize to beads which remain suspended in the aqueous phase. This slurry is then dewatered by centrifugation and dried by hot air. The dry beads are packaged in fiber drums or boxes for sale.

Liquid acrylic sirup is produced in a continuous bulk polymerization reactor. The reaction is quenched at 20% conversion, by cooling and addition of an inhibitor. A cross-linking agent is added to enhance the physical strength of Corian®* before it is shipped to Yerkes in tank cars.

* Indicates Du Pont's registered trademark.

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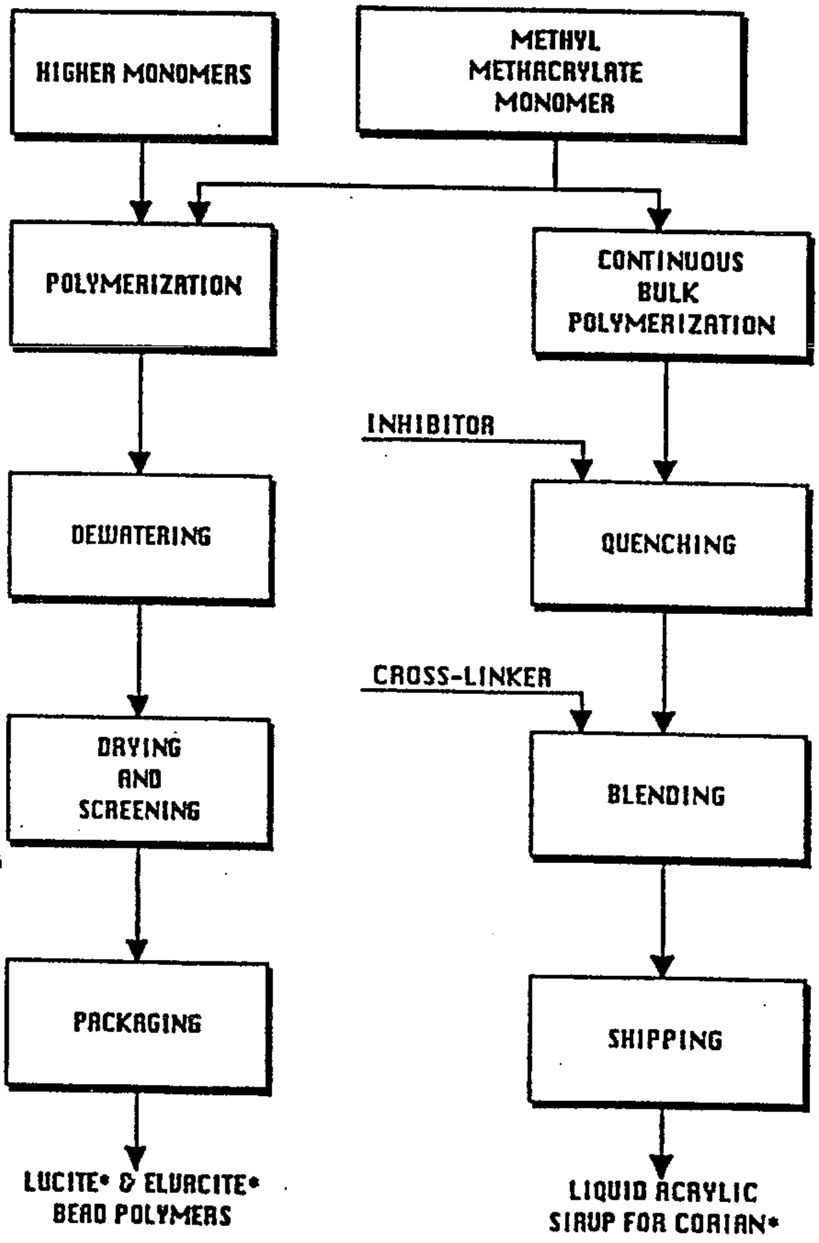
Acrylics Process



* Indicates Du Pont's registered trademark.

Filaments Process

Nylon, polyester, and TEFLON®* polymers are melted in either grids or extruders and pumped through spinnerette plates to form filaments which are water quenched, drawn (stretched), heat set, and packaged as hanks, spools, or tapered bundles.

Principal end uses include toothbrushes, paintbrushes, cosmetic and hair brushes, industrial brushes, and STREN®*, STREN SUPERTOUGH®*, HIGH IMPACT®*, and MAGNUM 7-20 fishing lines.

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* Indicates Du Pont's registered trademark.

Filaments Process

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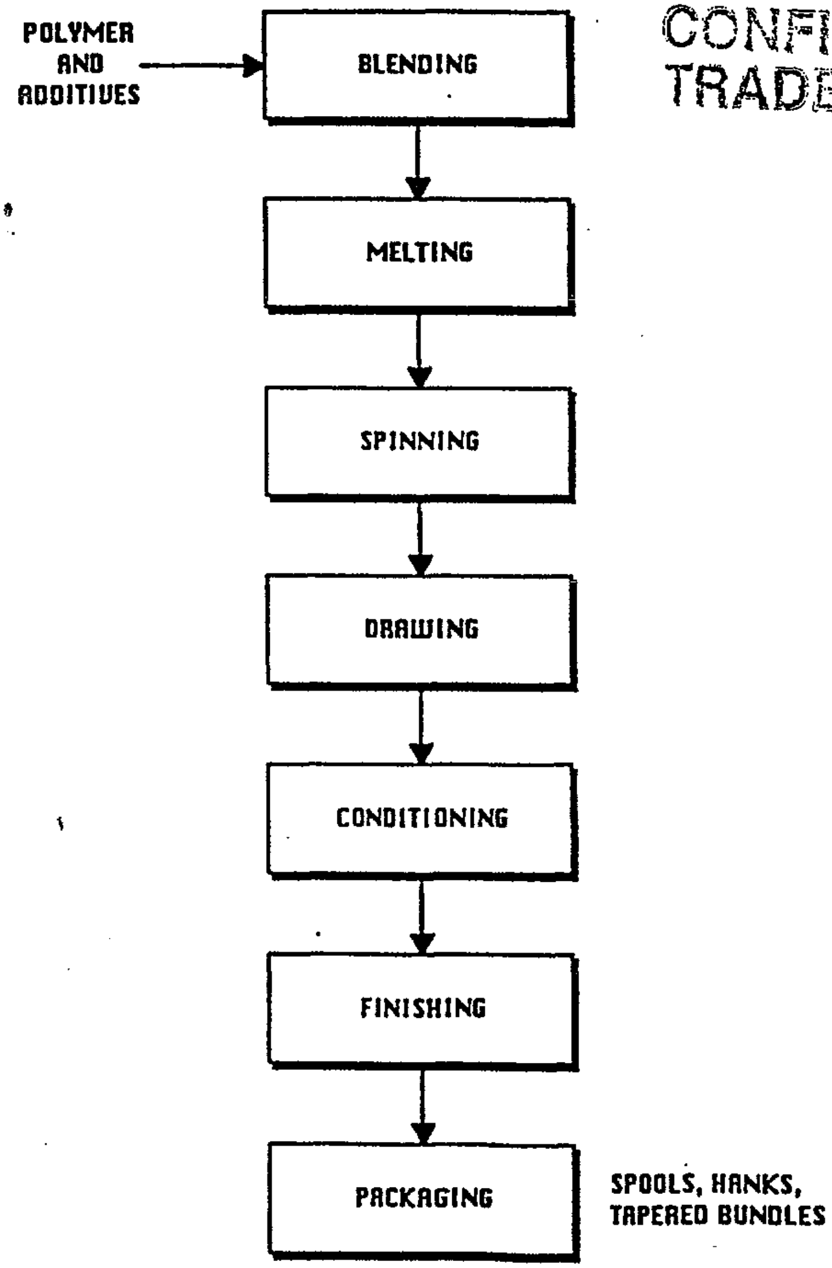

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Specialty Compounding Process

Specialty Compounding Business Team at Washington Works provides small volume compounds in support of the Engineering Polymers Enterprise. The facility (started up in 1991) will have the capability to handle the range of engineering polymers: polyacetals, nylons, and polyesters. The equipment has the flexibility to economically melt-compound small lot quantities (less than 20,000 pounds). This allows for faster response with reduced finished product inventory and quick commercialization of new compounded products.

In addition to the polymer feedstocks, various additives (e.g. tougheners, strengtheners, colorants, etc.) are mixed together and fed to extruders. The extruders compound the additives into the base polymers, and the compounded polymer is then extruded through dies to a quenching step and cutting step.

The 1/8" long pellets from the cutting step are screened to remove fines/longs and packaged in bags or boxes.

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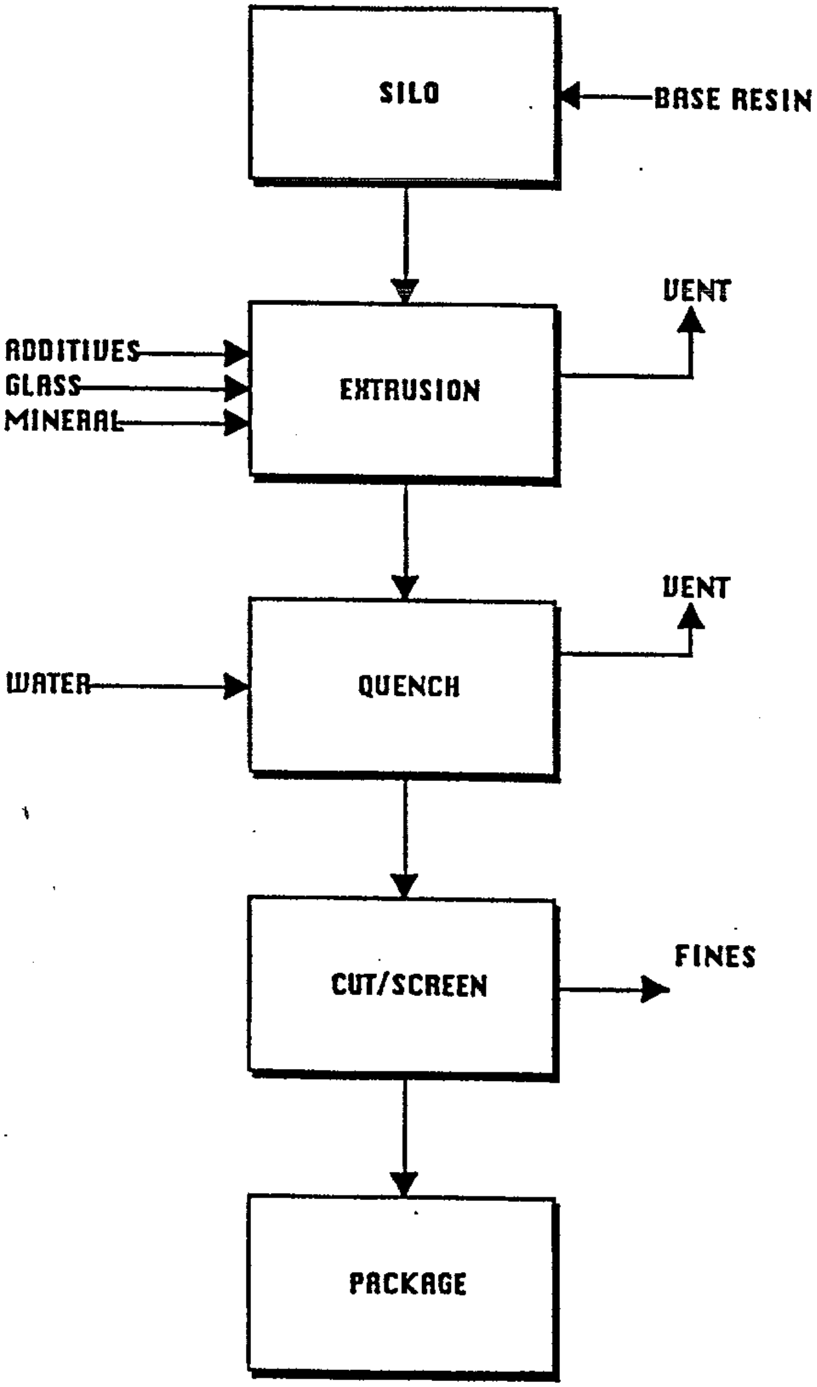
Specialty Compounding Process



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TEFLON®* Copolymers Compounding

Specialty products are manufactured in Copolymers Compounding. Spherical "bead" products are produced using various feedstocks, primarily (1) TEFLON®* PFA or FEP dispersions, (2) TEFLON®* PFA or TEFZEL®* slurry (polymer in FREON®*- 113 solvent). Current products made are used for spray coating and rotomolding end-use. Other projected operations for compounding include: (1) incorporation of additives, carbon black for conductive/antistat products, (2) concentrate production, such as precursors for foamable products, and (3) development of other new compositions requested by customers.

Each product is initially made in a pelletization operation where small particles (10-50 micron) from the feedstocks are agglomerated to larger particles or beads (300-1200 micron). Pelletization is accomplished through gelling (using gelling agents) and a two-phase mechanical shear coagulation step using a variable speed agitator.

Following pelletization, the solvent/water phases are separated by batch distillation. Most products are baked in batch tray ovens to remove residual water and to harden the bead. Bead product can also be fluorinated to provide stable end groups.

* Indicates Du Pont's registered trademark.

TEFLON®* Copolymers Compounding

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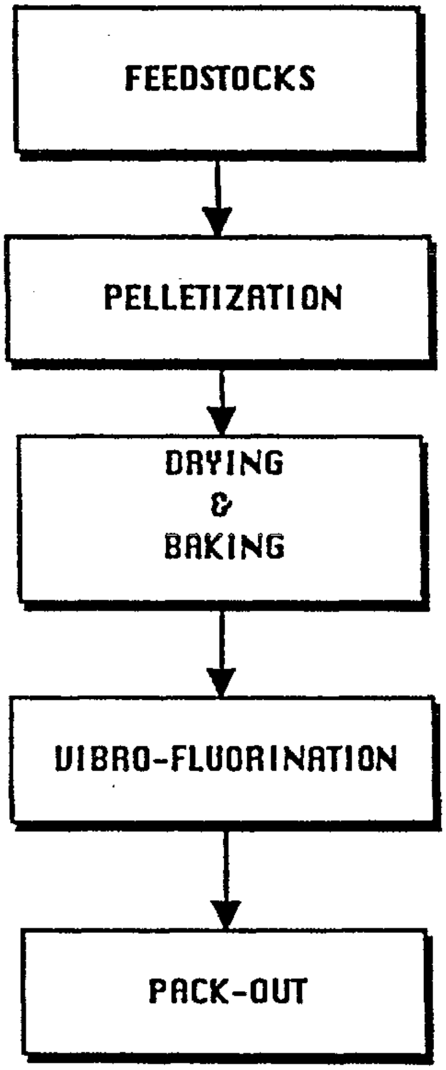

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BUSINESS CONFIDENTIAL SUBMITTAL

(Letter, Stewart to Caspar, dated 3/20/97)

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* cover letter only